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Students were identified by 1) teacher observation 2) school grades 3) grade placement on standardized tests 4) grades on intelligence tests 5) personality check lists 6) interest inventories 7) parent observations and 8) individual case studies. The objectives of educating the academically talented were to provide stimulating activities and materials beyond the classroom level, to promote higher achievement in such areas as critical thinking, basic skills, citizenship, understanding of environment, and to develop a harmonious personality. The three methods of construction that were used for the programs were enrichment, acceleration and ability grouping. In the program, the four subjects emphasized were mathematics, science, reading, and social studies.

Evaluation of the program revealed that in all cases of comparison the experimental groups were superior to the control groups. The hypothesis that a program of acceleration and enrichment for the academically talented student causes him to gain more academically was not supported with any degree of certainty. The hypothesis that a program of acceleration and enrichment for the academically talented student produced a school atmosphere in which the average student gains more academically was supported.

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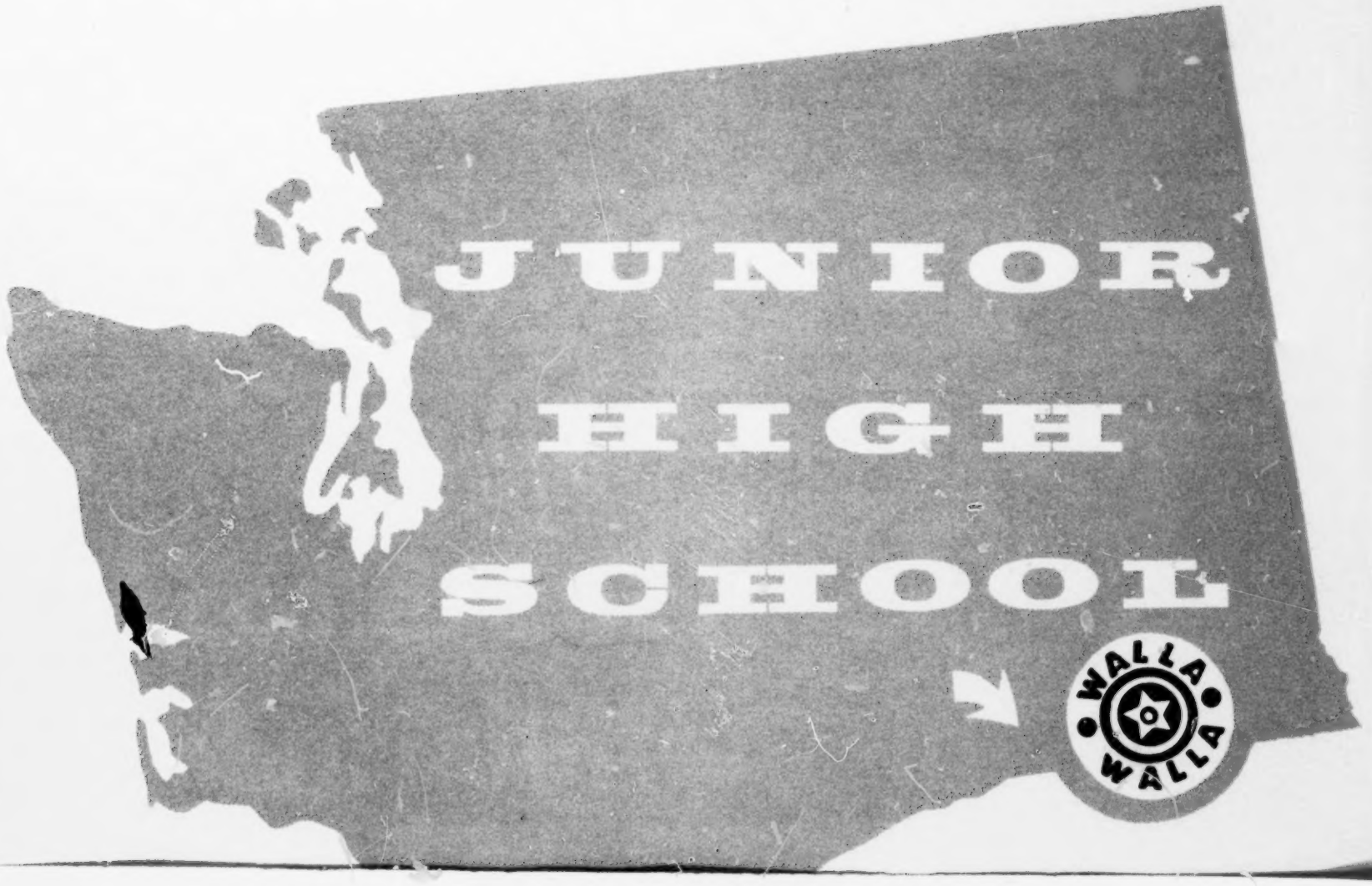

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LOUIS BRUNO
STATE SUPERINTENDENT
OF PUBLIC INSTRUCTION
OLYMPIA, WASHINGTON

THE SEAL OF THE STATE OF WASHINGTON · 1889 ·

ACCELERATION AND ENRICHMENT IN THE JUNIOR HIGH SCHOOL

By Mr. Harry Cobain
Walla Walla Public Schools

Dr. Paul M. Ford
Whitman College

LOUIS BRUNO
State Superintendent of Public Instruction
Olympia, Washington

Research Report No. 03-02

TECHNICAL RESEARCH ADVISORY COMMITTEE

Acknowledgment is Hereby Expressed to These Committee
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This contract research project was made possible by an appropriation for research and gifted programs by the 1961 Washington State Legislature to the Office of the Superintendent of Public Instruction.

Prepared under the staff supervision of
the State Office of Public Instruction

Ray E. Jongeward, Director of Research
Chester D. Babcock, Asst. Supt., Division of Curriculum and Instruction
Lewis Bloom, Coordinator of Programs for Gifted Children

June 1963

WALLA WALLA PUBLIC SCHOOLS

SCHOOL DISTRICT NO. 140

WALLA WALLA, WASHINGTON

ARTHUR D. JONES, SUPERINTENDENT
ALLEN REYNOLDS, ASST. SUPT.
K. A. TIDRICK, HIGH SCHOOL PRINCIPAL
EARL BLAKE, SECY. OF THE BOARD

May 27, 1963

Mr. Louis Bruno
State Superintendent of Public Instruction
Olympia, Washington

Dear Mr. Bruno:

The Walla Walla Public Schools initiated a program for the academically talented students in the fall of 1958. Since that time there has been a continuous growth and interest in the program. Although a certain amount of evaluation has been carried on for sometime, the first serious attempt to analyze the effectiveness of acceleration and enrichment in our two junior high schools was made possible by our research grant from your office. We feel that this project will be extremely valuable to us and feel that it will be of real value to other districts. The grant has served to further stimulate the entire staff in their continuing re-evaluation and improvement of the total instructional program.

We are indebted to Dr. Paul M. Ford, Assistant Professor of Education at Whitman College who supervised the study and compiled the final report, and to Mr. Harry Cobain, mathematics teacher at Garrison Junior High School, who conducted the research; and also to Mrs. Catherine Rew, Director of Special Services and Mr. Franklin B. "Pete" Hanson, Principal of Garrison Junior High School, for their able assistance.

We would like to express our appreciation to Dr. Ray Jongeward, Director of Research, who has given us so much encouragement and assistance throughout the course of this project, as well as to the Research Advisory Committee for their approval of the grant.

We hereby submit a copy of the research project "Acceleration and Enrichment in the Junior High School" for your approval.

May we again express our thanks to the State Department of Education for making this study possible.

Sincerely yours,

Allen Reynolds

Allen Reynolds
Assistant Superintendent

AR:wb

PREFACE

The idea for this research project originated with Mrs. Catherine Rew, Director of Special Education for Walla Walla School District 140, and Mr. Harry Cobain, a teacher of mathematics at Garrison Junior High School in Walla Walla. Having been associated with the Program for the Academically Talented in the Walla Walla Schools since its inception in 1958, these individuals saw the need for an analysis of the effect of the program on both the academically talented and average student. Mr. Cobain and Dr. Paul Ford of Whitman College worked together in conducting this analysis. Mr. Cobain was responsible for administering the testing program connected with the project, and for the statistical analysis of test results; Dr. Ford set the design for the project and was responsible for the preparation of the research report.

The researchers wish to acknowledge their gratitude to Dr. Ray E. Jongeward, Research Director, Office of the Superintendent of Public Instruction for the State of Washington, for his aid in supporting this study.

Mr. Allen Reynolds, Assistant Superintendent of Schools for School District 140, Mr. Franklin B. "Pete" Hanson, Principal of Garrison Junior High School, Mr. Erwin Beard, Principal of Pioneer Junior High School and Mrs. Catherine Rew of the Walla Walla Schools have been most cooperative.

The interest of all who participated in this study is deeply appreciated and hereby acknowledged.

H. H. C.

P. F.

Walla Walla, Washington

June 1963

THE HISTORY OF ACCELERATION AND ENRICHMENT IN THE WALLA WALLA SCHOOLS

Since 1958 Walla Walla School District 140 has been engaged in research to determine the usefulness of acceleration and enrichment in certain subject areas at certain grade levels. This report describes the history of the program and then attempts to evaluate learning outcomes in two Walla Walla junior high schools which have been involved in the program since 1958.

In 1958 a group of citizens and educators in Walla Walla formed a committee which offered recommendations regarding a curriculum for the academically talented students in the district. These recommendations were made in the conviction that they were essential to a democratic philosophy of education; that is, a belief that each individual is unique and deserves an opportunity to develop his abilities to the fullest and that individuals are happiest and most effective when their abilities are being fully challenged and utilized.

Analysis of the existent curriculum in District 140 revealed that programs to facilitate effective education of mentally and physically handicapped children had been provided; in addition, talented students in non-academic areas such as music, art, athletics, agriculture, and vocational arts were being challenged. But at the same time it was apparent that there was no adequate program for the academically talented student. This inadequacy was indicated in answers to a questionnaire which was circulated among recent graduates of Walla Walla High School; the graduates questioned ranked in the top quartile of their respective classes. Respondents to the questionnaire indicated that they had not felt sufficiently challenged by the public school curriculum.

After a period of study, the committee offered a number of recommendations for educating the academically talented. For identification of the academically talented child, the following criteria seemed appropriate:

(1) teacher observation; (2) grades in school; (3) grade placement on standardized tests; (4) grades on intelligence tests; (5) personality check lists; (6) interest inventories; (7) parent observations; (8) individual case studies. Identification would consist of two processes: (1) screening - ranking children from low to high ability by means of standardized tests and observed performance under standardized conditions; and (2) selection - determining which of the students observed would be eligible for the specialized program.

As proposed, the process of identifying and educating the academically talented students would extend from grade one through twelve as an integral part of the educational system. Allowing for some variations in separate school buildings, about fifteen percent of the district school enrollment would participate in specialized instruction; further, it was hoped that other students would benefit indirectly from the program. The program was to be established first in basic studies, then gradually in the creative and mechanical arts. The committee noted that only through a sequential, well coordinated curriculum from grades one through twelve could the program for the academically talented prosper.

The committee suggested that educational policy for the academically talented child should include these objectives: (1) provide stimulating activities and material beyond the regular classroom level, not just an overloading of normal work assignments; (2) promote higher achievement in such areas as critical thinking, basic skills, citizenship, understanding of environment, and world understanding; (3) develop a harmonious personality.

Three methods of constructing a program for the academically talented were indicated by the committee: (1) enrichment; (2) acceleration; (3) ability grouping. Enrichment was defined as selection and organization of learning experiences most appropriate to an individual's highest development. Ideally, it would consist

of such elements as creative or experimental activity, independent work, cooperative planning, extensive reading and first-hand experiences that would lead to high standards of accomplishment. Acceleration was defined as any modification of a program which enables the student to progress more rapidly and to complete a program in less time or at an earlier age than was traditional. Subject acceleration was recommended as an initial procedure; grade acceleration might be employed after further study. Ability grouping would consist of organizing children of a certain ability level into separate "clusters", classes, or even schools - the concentration depending upon the administrations' concern for "mixing" children of varying ability. It was recommended that Walla Walla use part time ability grouping at the elementary level, and ability grouping by subject at the junior and senior high school level. It was suggested that the Advanced Placement Program be initiated to enable high school seniors to earn college credit for college level work.

The committee also proposed a number of recommendations which would call for administrative adjustments. First, it was clear that a person should be appointed whose prime responsibility it would be to supervise the program. Second, specific funds for personnel and supplies should be set aside. Third, a procedure for the selection of qualified teachers should be developed. Special in-service training should be introduced to prepare these teachers for their responsibilities; this training would stress teacher orientation to the needs of the gifted student and methods of meeting these needs. Fourth, in each school one teacher participating in the program would have a reduced teaching load so that he might have time to plan and supervise the program within his building. This coordinator would work with other coordinators in the school system and with the supervisor of the overall program for the academically talented. Fifth, evaluation of the

program and its effects should be continuous.

Although recommendations were given for adjustments in all subject areas, the program as initiated in Walla Walla concentrated upon mathematics, science, reading, and social studies. For each of these subjects a subcommittee was formed which reported on specific means for developing a program for the academically talented.

The mathematics subcommittee proposed a program of enrichment and acceleration starting in the lower grades and progressing through secondary school. All schools would make use of object teaching material (concepts of design and proportion - squares, triangles) and visual aids; students would be encouraged to extend their interest by reading, visitation and general observation. Elementary school emphasis would be upon social and scientific uses of arithmetic and maintaining certain skills at each level. The junior high school program, to allow a broader experience in secondary mathematics, would offer an accelerated program for which academically talented students would be selected in the seventh grade. For teacher training, the National Science Foundation Summer Institute Program was recommended. In addition, School District 140 provides grants to teachers for study at the graduate level.

Specific curriculum offerings at the junior high level would include for the seventh grade: fundamentals in the first semester, and broader concepts in the second semester - plane figures, solids, geometric concepts involving lines, angles, parallels, use of protractor and compass, proportion, ratios, equations, and graphs. At the end of the year, a mathematics mastery test and an algebra readiness test would be given to determine which students should go on to algebra in grade eight. Those students in the eighth grade not taking algebra would be given enrichment in elements of general mathematics such as charts, graphs, magic squares and the like. In the ninth grade, students who had taken algebra in

grade eight and who had proven their ability would be offered plane geometry.

The mathematics subcommittee held that acceleration in junior high school mathematics would enable talented students to prepare more adequately in high school for college requirements by taking advanced algebra, trigonometry, mathematical analysis, and a review of all previous mathematics courses. Generally then, the mathematics program established as its main goals: (1) provision of sound mathematical training for future leaders in science, mathematics and related fields; (2) provision of mathematical competence for ordinary affairs of life; (3) subject acceleration from grade seven through grade twelve, thus allowing students to take more work in mathematics than would be the case otherwise.

The science subcommittee recommended a coordinated curriculum from grade four through twelve which would involve enrichment in the elementary schools and ability grouping and enrichment in the junior and senior high school. In addition, general science would be taught as a full credit course in the seventh and eighth grades; science facilities would be increased to enable more students to participate fully in laboratory work. At the high school level, ability grouping would be introduced in science classes; chemistry would preceed rather than follow physics and the physics course would be brought up to date. Most important in the subcommittee's report was the recommendation that a supervisor of sciences be appointed. His tasks would be to coordinate the high school mathematics and science program and work with junior high school and elementary school teacher-coordinators in developing a sequential curriculum in the sciences.

The objectives suggested by the language arts subcommittee were to develop in students: (1) intelligent, perceptive reading; (2) precise, clear, imaginative writing; (3) skilled oral communication; (4) critical thinking. To achieve these objectives the subcommittee recommended the following procedures. First, the introduction of an ungraded primary school and, after students had acquired basic

reading skills, the Joplin Reading Plan. Second, ability grouping in English classes throughout the junior and senior high school. Third, the development of a sequential composition program from grades seven through twelve. Fourth, the scheduling of free reading time for academically talented students in the school libraries.

The Program for the Academically Talented became a reality in the Walla Walla schools in 1959. Its beginnings were on a limited scale. But since 1959, the program has spread throughout most of the elementary schools in the district, into both junior high schools and on a limited scale into the high school. The program has been under the general supervision of Mrs. Catherine Rew, Director of Special Education for the Walla Walla schools.

As the 1958 educational planning committee had proposed, evaluation of the program for academically talented children has been continuous since 1958. In the period from 1959 through 1961 observation and evaluation of the program were conducted by Mrs. Catherine Rew. In the spring of 1962 Dr. Clifford W. Williams, Director of Special Curriculum Projects in the Portland, Oregon schools evaluated the program.

Mrs. Rew reported that it had been of value to begin the program on a small scale, since certain weaknesses had become apparent from the outset of the program. First, there was a need for better definition of the responsibilities of the personnel involved in the program. Second, additional in-service training was needed to prepare teachers for their duties. Third, Mrs. Rew suggested that liaison between the schools and parents of children participating in the program be strengthened.

Dr. Clifford Williams, in his 1962 evaluation of the program, pointed to a number of difficulties. First, although the program for the academically talented

was functioning effectively under the direction of Mrs. Rew, the Director of Special Education, this situation gave both teachers and the community the false impression that the program was a form of special education. In fact, the program should be considered as an adjustment within the curriculum which is part of the general educational responsibility of the community. Second, the Walla Walla schools had no supervisor whose sole responsibility it was to oversee, improve, and inter-relate the total curriculum development and instructional program for the schools. Such a person would be the logical director of the program for the academically talented. Third, the expense of the program was submerged in other budgets; to ease operation and to clarify expenditures, a separate budget with a clear statement of anticipated expenses should be established. Fourth, since classes for the academically talented should be smaller than the traditional 20-25 students, Dr. Williams suggested that an additional teacher be placed on the faculty of each junior high school to cut down the teaching load of teachers involved in the program; the same revision should be made in the high school faculty when the program expanded into the high school. Finally, Dr. Williams noted that a program for the academically talented depended for its success to a very large degree on the amount of cooperation, exchange of information and planning that takes place among the elementary schools, junior high schools and the senior high school. Without a completely integrated program, success would be difficult if not impossible to achieve.

Generally speaking, Dr. Williams felt that the program as it operated in the spring of 1962 was effective in identifying and selecting students and in meeting their needs in the areas of mathematics, science, reading, and social studies. The program had been initiated in several elementary schools and in the two junior high schools. Enrichment was practiced in the elementary schools, while both enrichment and acceleration were used in the junior high schools.

THE 1962-63 RESEARCH STUDY

In September of 1962 funds were made available by the Research Office of the Office of the Superintendent of Public Instruction and by Walla Walla School District 140 for an investigation of the effect of acceleration and enrichment in two Walla Walla junior high schools. Subject acceleration was practiced in mathematics; enrichment in science and reading. Mr. Harry H. Cobain, a teacher of mathematics at Garrison Junior High School, and Dr. Paul Ford of Whitman College carried on the investigation.

The Problems and Hypotheses

Two problems were investigated. First, does a program of acceleration and enrichment for the academically talented student cause him to gain more academically than equally talented students who are not exposed to such a program? Second, does the program of acceleration and enrichment for the academically talented student produce a school atmosphere in which the average student gains more academically than he would otherwise?

These two questions served as the basis for two hypotheses which the researchers wished to test. First, a program of acceleration and enrichment for the academically talented student causes him to gain more academically than equally talented students not exposed to such a program. Second, a program of acceleration and enrichment for the academically talented student produces a school atmosphere in which the average student gains more academically, even though he is not directly exposed to acceleration and enrichment, than do his peers in schools in which there is no program of acceleration and enrichment.

Definition of Terms

The following terms used in the Walla Walla junior high schools require definition: "gifted" or "academically talented", "average", "acceleration" and "enrichment".

(1) A gifted or academically talented student is one whose I.Q. is 120 or above and his grade placement is two years or more above the national norm for his chronological age as measured by standardized achievement tests in reading and mathematics. The Kuhlmann-Finch Intelligence Test, 7-9 and the California Test of Mental Maturity, 7-10 were used as measures of intelligence. The California Achievement Tests, 7-9 were used in reading and mathematics. In addition to the above-mentioned academic factors and previous grades received in school, each student in order to qualify for placement in the program for the academically talented was rated by his teachers on ten personality factors and ten other factors pertaining to academic and study skills. (Please see APPENDIX A.) If a student ranked in the top fifteen per cent of his class at the beginning of the seventh grade according to all of the academic and personality factors mentioned, he was placed in the program for the academically talented.

(2) The average student is one whose I.Q. falls between 100 and 115 and his grade placement is equal to the national norm for his chronological age as measured by standardized achievement tests in reading and mathematics. The same tests were used to identify average students as were used to identify gifted students.

(3) Acceleration or an accelerated program is a means by which academically talented students complete a sequence of learning experiences in less time than would be the case traditionally. In the Walla Walla junior high schools involved in this study, acceleration was practiced only in the mathematics curriculum; thus, academically talented students took seventh and eighth grade mathematics in grade seven, algebra in grade eight and geometry in grade nine.

(4) Enrichment of the curriculum means that the curriculum is given more depth and breadth than it has been given traditionally, although students do not accelerate.

Enrichment in this study applies to the science and reading programs offered to academically talented students in the two Walla Walla junior high schools. In science classes enrichment includes: (1) instruction in research methods; (2) experiments by students which are carefully planned and supervised; (3) the use of multiple texts and audio-visual materials; (4) field trips to view specific phenomena in nature, in industrial facilities, and in museums; (5) resource speakers when appropriate.

Enrichment in reading is of a dual nature and it includes : (1) the use of Science Research Associates materials and exercises designed to improve reading and study skills; (2) a sequential examination of American literature. No one text is used exclusively in the study of literature, but rather a variety of materials varying in difficulty to texts which have been traditionally used in the senior year of high school. Planned programs of independent study are carried on by students who are scheduled into the school library at least once each week.

Research Design

The research design described below sought to test the two hypotheses posed earlier in this study. Stated generally, seven groups of approximately twenty-five students each were selected from both the gifted and average ability levels; of the seven groups, four were experimental groups and three control groups. Identification of gifted and average students, both experimental and control groups, was made as a result of evaluation of academic and personality factors listed above in the definitions of "academically talented" or "gifted" and "average"; identification took place when students entered the seventh grade.

Two homogeneous groups of gifted or academically talented students which had been exposed to acceleration and enrichment for two years, grades seven and eight--the experimental groups--were compared to a selected population of academically

talented students which had not been exposed to such a program - the control group. Experimental groups were matched to the control group by I.Q. and grade placement on standardized achievement tests in reading and mathematics in grade seven and chronological age and sex. The same procedure was used to match experimental groups of average students to control groups of average students. The details are given below.

1. Experimental Groups (Academically Talented Students)

   The experimental groups consisted of twenty-five students who entered the ninth grade at junior high school "A" in September of 1962 and twenty-five students who entered the ninth grade at junior high school "B" at the same time. Both groups had been exposed to acceleration and enrichment during grades seven and eight. (Code names rather than actual names of the schools involved are used throughout this report.)

2. Control Group (Academically Talented Students)

   It was originally planned to select one control group of twenty-five students from students who entered the ninth grade at junior high school "A" in September, 1962 from school "D" in which there was no acceleration or enrichment program for grades seven and eight. Unfortunately, however, a small number of academically talented students from school "D" decided to attend a private school and so did not enroll at school "A" as had been expected. The result of this situation was that the "D" sample could not be used because it could not be matched with the experimental groups.

   A control group of twenty-five students was also selected from the town of "F". F's socio-economic makeup is comparable to that of Walla Walla, but acceleration and enrichment are not practiced in the schools of "F". It was first thought by the researchers that the "F" sample would be used to control for the so-called "Hawthorne Effect"; that is, individuals, such as those in

the control class from the school "D" who enter junior high school "A", sometimes behave differently if tested when they are aware that they are in an experimental situation than they would otherwise; thus, test results would not be valid. In fact, because the "D" sample did not contain enough academically talented students, the "F" sample was the only control group that could be matched with the academically talented experimental sections.

3. Experimental and Control Groups (Average Students)

The procedures detailed above were followed in selecting experimental and control groups of average students. In this case the "D" sample proved to be sufficient in quantity and quality to be matched as a control group with the experimental groups.

The basic research design can be represented in the following manner: (Please note that all students considered were September ninth graders - September, 1962.)

School "A"	School "D"	School "F"
X^1	C^1 - Inadequate Sample	C^3
X^2	C^2	C^4
School "B"		
X^3		
X^4		

X^1, X^3 - Gifted Students Exposed to Acceleration and Enrichment

X^2, X^4 - Average Students in Schools Where Acceleration and Enrichment are Practiced

C^1, C^3 - Control Groups, Gifted

C^2, C^4 - Control Groups, Average

Note: Groups X^1 and X^3 were compared through testing to C^3, but could not be compared to C^1 because of the inadequate sample. Groups X^2 and X^4 were compared to groups C^2 and C^4.

Testing Program

Early in October of 1962 the experimental and control groups were given a series of standardized achievement tests. The dependent variable was the difference between scores made by the experimental groups and those made by the control groups. The tests used were the reading, mathematics and science sections of the Educational Testing Service's SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS, Form 3A. The reason for the use of this series can be explained in terms of the following statement from the CATALOG OF THE COOPERATIVE TEST DIVISION of E.T.S. (P. 12). "The STEP Series are achievement tests which evaluate the student's application of knowledge . . . in fundamental fields; they are designed to measure the general outcomes of education rather than specific course content." Since the researchers wished (1) to compare students who had studied algebra to those who had not, and (2) to compare students who had been exposed to breadth and depth in curriculum content in science and reading to those who had not, the STEP Series--because of its emphasis on general rather than specific achievement--seemed to be an appropriate instrument.

Administrators and guidance personnel in the schools involved were most cooperative in carrying out the testing program. Upon completion of the testing program, the answer sheets were sent to the Educational Testing Service at Los Angeles, California to be scored by machine. The scored answer sheets were returned late in November.

Test Results (Academically Talented Students)

Each experimental group X^1 and X^3, was matched in September of 1962 for I.Q., chronological age and sex with the control group, C^3. The mean I.Q. for each group was 128 (Kuhlmann-Finch); the mean chronological age in months was 173; the ratio of males to females in each group was 3 to 2.

The mean converted score made by each experimental group on each of the three sections of the STEP Series was compared to the mean converted score made by the control group on each of the three sections of the STEP Series. The "t" test was used to determine significance in comparing the scores of the experimental groups to those of the control groups. TABLE I outlines the results of the comparison.

TABLE I

ACADEMICALLY TALENTED EXPERIMENTAL GROUPS COMPARED TO THE ACADEMICALLY TALENTED CONTROL GROUP

	"X" GROUP	"C" GROUP	"t" TEST RESULT[a]	SIGNIFICANCE
Reading	X^1	C^3	"t" = 2.27	Significant
Mathematics	X^1	C^3	"t" = 1.00	Not Significant
Science	X^1	C^3	"t" = 1.11	Not Significant
Reading	X^3	C^3	"t" = 2.00	Significant
Mathematics	X^3	C^3	"t" = 3.5	Significant
Science	X^3	C^3	"t" = 1.64	Not Significant

a - A "t" score of 1.71 or higher is significant at the five per cent level of confidence.

X^1's performance was significantly superior to C^3 in the Reading Test, but not so in the Science Test; X^1 had been exposed to enrichment in both of these subjects while C^3 had not. X^1's performance was not significantly superior to that of C^3 in the Mathematics Test even though X^1 had been exposed through acceleration to algebra, while C^3 had not. X^3's performance was significantly superior to that of C^3 in the Reading Test, but not in the Science Test. These were enrichment subjects for X^3. X^3's performance on the Mathematics Test was significantly superior to that of C^3.

The test results and comparisons indicate that in all instances the experimental groups were superior to the control groups, but in only three of the six comparisons was the performance of the experimental groups significantly superior to that of the control group. The comparison indicates some consistancy as well as inconsistancy in the performance of the experimental groups. In reading, for instance, both experimental groups were clearly superior to the control group; in science both experimental groups failed to show significant superiority over the control group. On the other hand, in mathematics one experimental group was obviously superior to the control group while the other experimental group was not.

These results led the researchers to question the curriculum and teaching methodology offered to the experimental sections. Why, for instance, should the experimental sections matched for intelligence, age, sex, and general academic and social maturity vary so in their performance on a standardized mathematics test if both sections were exposed to the same curriculum? As is shown in TABLE I above, X^3's performance on the mathematics test was significantly superior to that of C^3 while X^1's performance was not. But even more striking, a "t" test comparison of X^3 to X^1 on the mathematics tests shows X^3 with a "t" score of 2.01, where 1.71 is significant at the five per cent level of confidence; thus, X^3 was significantly superior to X^1.

One plausible reason for the diference between X^3 and X^1 is that the curriculum and/or methods by which the curriculum was presented to the two experimental sections differed. This consideration certainly bears out the need for at least two courses of action. First, there is a need for analysis of the performance of the two experimental sections on each item of the mathematics achievement test. This could well lead to the discovery of general and perhaps specific areas of weakness in the performance of X^1. Second, there is an apparent need for a

thorough-going analysis of the curricular materials, including actual lesson plans and texts used by the teachers involved in teaching mathematics to the academically talented student in the two Walla Walla junior high schools. Reasons for the inadequate performance of one of the experimental groups may well be found within the curriculum itself. It would be most useful to see what differences in material and approach exist from one junior high school to the other.

But the major problem at hand is this: Why is it that an experimental section, X^1, which has been exposed to subject matter acceleration, in this case algebra, does not perform on a test of general mathematical knowledge and understanding in a manner which is significantly superior to that of a control group which has not been exposed to algebra? It might be claimed that the test, itself, was too easy or too difficult or that it did not test for the appropriate types of learnings. Yet the statisically significant superiority of the experimental section, X^3, over both X^1 and C^3 argues persuasively against such a conclusion. Detailed analysis of test performance and instructional materials should be most useful in answering the questions posed above.

Another question which requires answering is this: Why is it that both experimental sections, exposed to enrichment in the science curriculum for two years, failed to demonstrate significant superiority over a control group which had experienced no such enrichment program? Again there seems to be a necessity for (1) an item analysis of the performance of the experimental sections on the science achievement test, and (2) an analysis of the science curriculum offered to the experimental sections of the academically talented students.

Statistical analysis does not support with any degree of certainty the hypothesis that a program of acceleration and enrichment for the academically talented student causes him to gain more academically than equally talented student not exposed to such a program. In three cases of comparison the hypothesis can

be supported, while in three cases it cannot be. It is clear that further investigation of the hypothesis could be profitably undertaken.

Test Results (Average Students)

Each experimental group of average students, X^2 and X^4, was matched in September of 1962 for I.Q., chronological age and sex with the control groups, C^2 and C^4. The mean I.Q. for each group was 108 (Kuhlmann-Finch), the chronological age in months was 174; the ratio of males to females was 1 to 1.

It will be noted in TABLE II below that in four of six instances of comparison the experimental sections of average students, X^2 and X^4, were significantly superior to the control group, C^2. Likewise, when compared to C^4, X^2 and X^4 proved to be significantly superior in four of six cases. TABLE II also indicates that in two subjects, reading and mathematics, both experimental groups were consistently superior to both control groups except for one case. On the other hand, in only one of four cases was an experimental group's performance in science significantly superior to that of a control group.

TABLE II

EXPERIMENTAL GROUPS OF AVERAGE STUDENTS COMPARED TO CONTROL GROUPS OF AVERAGE STUDENTS

TEST	"X" GROUP	"C" GROUP	"t" TEST RESULT[a]	SIGNIFICANCE
Reading	X^2	C^2	"t" = 3.00	Significant
Mathematics	X^2	C^2	"t" = 1.4	Not Significant
Science	X^2	C^2	"t" = 1.2	Not Significant
Reading	X^4	C^2	"t" = 1.81	Significant
Mathematics	X^4	C^2	"t" = 1.80	Significant
Science	X^4	C^2	"t" = 1.80	Significant
Reading	X^2	C^4	"t" = 2.2	Significant
Mathematics	X^2	C^4	"t" = 2.1	Significant
Science	X^2	C^4	"t" = 1.2	Not Significant
Reading	X^4	C^4	"t" = 2.16	Significant
Mathematics	X^4	C^4	"t" = 2.6	Significant
Science	X^4	C^4	"t" = .8	Not Significant

a/ A "t" score of 1.71 or higher is significant at the five per cent level of confidence.

In eight of twelve cases of comparison, the experimental groups of average students were clearly superior to the control groups. These results appear to support, if but marginally, the hypothesis that a program of acceleration and enrichment for the academically talented student produces a school atmosphere in which the average student gains more academically than his peers in schools in which there is no such program.

This conclusion is strengthened by the fact that it was in the area of science that the experimental groups failed to prove clear superiority over the control groups. For it was in this very same subject and only this subject that neither experimental group of academically talented students proved clear superiority over the control group. It may well be that had the science program for the academically talented students been sufficiently strong, it, like the reading and to a lesser degree the mathematics program, would have influenced the performance of the average groups of experimental students.

While there is not sufficient statistical proof in this situation to support completely the researchers' "atmosphere" hypothesis, still the evidence at hand tends to support this hypothesis. A program of acceleration and enrichment for the academically talented may very well create a "shadow" effect which results in higher academic achievement for average students than is the case where students are educated in schools in which there is no such program. It may well be that teachers who work with the average groups, and who very often are the same teachers who work with the academically talented students, tend to upgrade the curriculum offered to average students. Here again, however, there is a need for further research which will yield statistics to confirm or to call into question the researcher's conclusion in regard to the "atmosphere" hypothesis.

Another set of findings is important here. This deals with the comparison of all experimental groups, including the academically talented and average students, to the control groups. (1) In reading, all of the experimental groups were significantly superior to the control groups. (2) In mathematics, in four of six comparisons the experimental groups were significantly superior to the control groups. One group of academically talented students was significantly superior to the control group; one was not. In three out of four comparisons the two experimental groups of average students were significantly superior to

the two control groups. (3) But in science, in only one of six comparisons was an experimental group significantly superior to a control group; in this case it was an experimental section of average students that was superior to a control group.

These findings suggest the real strengths and weaknesses of the Walla Walla program for the academically talented in grades seven and eight. While the reading program appears to be very strong, the mathematics curriculum will require some reworking. The science program, however, requires close re-evaluation by School District 140.

In addition, it is probably no coincidence that the performance of the experimental sections of average students in this study closely mirrors that of the experimental sections of academically talented students. Thus, the program for the academically talented seems to have important implications for the average student in the Walla Walla schools.

Finally, in comparing the two experimental schools to the two control schools, experimental school "B" proved to be consistently superior to experimental school "A". The academically talented group from school "B" was significantly superior to the control school in two of three cases of comparison, while the academically talented group from school "A" was significantly superior to the control group in only one of three comparisons. The group of average students from school "B" was significantly superior to the two groups from the control schools in five of six comparisons, while the average students from school "A" were significantly superior to the two groups from the control schools in only three of six comparisons. Taking into account the performance of both the sections of academically talented and average students from the experimental schools, school "B" was significantly superior to the control schools in seven of nine comparisons, while school "A" was superior in four of nine comparisons.

These figures seem to indicate a variance in the quality of programs, both for the academically talented and average student from one experimental school to the other. Certain questions require answers. Why is it that matched student populations from two different schools exposed to the same instructional materials perform so differently on standardized achievement tests? Are these differences a function of differences in the instructional materials or teaching methodology offered from one school to the other? If such differences are present, why are they present? Finally, has the research design itself failed to take into consideration some basic difference between students from school "A" and school "B" which invalidates comparison of the performance of the two groups? All of these questions need to be dealt with if a true evaluation of the usefulness of acceleration and enrichment is to be gained.

CONCLUSION

(1) In all cases of comparison the experimental groups were superior, though not always significantly superior, to the control groups.

(2) The performance of the experimental group of academically talented students from school "B" supports the hypothesis that a program of acceleration and enrichment for the academically talented student causes him to gain more academically than equally talented students not exposed to such a program. The performance of the experimental group of academically talented students from school "A" does not support the hypothesis. Taken together, the performance of students from schools "A" and "B" does not support the hypothesis with any degree of certainty.

(3) The performance of the experimental group of average students from school "B" supports the hypothesis that a program of acceleration and enrichment for the academically talented student produces a school atmosphere in which the average student gains more academically, even though he is not exposed directly to acceleration or enrichment, than do his peers in schools in which there is no such program. The performance of the experimental groups of average students from school "A" does not support the hypothesis with any degree of certainty. Taken together, the performance of students from schools "A" and "B" tends to support the hypothesis.

(4) There are obvious differences in the performance of the experimental groups from schools "A" and "B"; these differences appear to indicate variance in the quality of instruction and/or instructional materials offered in the two schools. At the same time, it is possible that some flaw in the experimental design might account for these differences.

(5) The program for the academically talented student in grades seven and eight in the Walla Walla schools tends to be extremely strong in the area of reading, while the same results have not been demonstrated in mathematics and science. (Note item 1 in the CONCLUSION.)

The 1962-63 Walla Walla study has yielded necessary but insufficient data; continued research, through the use of an enlarged experimental design could prove most useful. A broader and more complicated design, encompassing three or four communities involved in acceleration and enrichment and two or more control schools, might provide additional data that would clarify the effect of acceleration and enrichment on the academically talented student. The enlarged design would also yield data to confirm or call into question the present researchers' conclusion regarding the "atmosphere" hypothesis; research in this particular area should include a number of control tests to be administered to experimental and control groups and questionnaires for both students and teachers included in the design.

The broadened design would also be useful in describing the amount of variance there is among school systems in instructional materials provided for academically talented students. In other words, it is not enough to say: "We have a program for the academically talented." What is important is the subject matter that is actually taught, how it is taught, and how much students learn. It seems logical that from a study concerned with these points, explicit instructional materials could be suggested which would prove successful, not just in the case of one school system, but in many.

Education publications are filled with ideas pertaining to the education of the gifted or academically talented, yet explicit programs are not often detailed for educating these students.[1] What is needed, and needed desperately, is a detailed, sequential, written, proved curriculum for each of the subjects which is to be a part of the academically talented student's learning experience. Until this type of approach is more fully developed, it appears that there will be great variance from one school system to the next in the effect on students of programs for the academically talented. This, however, is not to argue that there is but one program, and one program only, in each subject area for academically talented students throughout the country. The point that is argued is this: that a thoroughly organized, systematic curriculum is essential and that this curriculum, while it may not be applicable in all situations, can probably be used, if only as a guide, in a number of different school systems. Further research, then, in the education of the academically talented student seems to be a necessity if we hope to develop students who are capable of taking advantage of all of their own potentialities.

1 For instance, see David C. Sanders, ELEMENTARY EDUCATION AND THE ACADEMICALLY TALENTED PUPIL (Washington, D.C.: National Education Association, 1961); Arno Jewitt (ed.), ENGLISH FOR THE ACADEMICALLY TALENTED STUDENT IN THE SECONDARY SCHOOL (Washington, D.C.: National Education Association, 1960); A Report of the Joint Commission on Education of Teachers of Science and Mathematics, IMPROVING SCIENCE AND MATHEMATICS PROGRAMS IN AMERICAN SCHOOLS (Washington, D.C.: American Association for the Advancement of Science and the American Association of Colleges for Teacher Education, 1960).

APPENDIX A

Student's Name _____ Grade _____ Home Room _____

Teacher _____ Subject _____ Date _____

ACADEMIC AND STUDY SKILLS		ATTITUDE AND PERSONALITY FACTORS	
Mastery of Subject		Desire for Excellence	
Meeting Requirements		Respect for School Rules	
Performance Beyond Requirements		Respect for Others	
Organization of Materials		Interest in Welfare of School	
Research Ability (Use of Library)		Honesty	
Initiative		Attention to Instruction	
Use of Language		Respect for High Ideals	
Contribution to Class		Politeness in Class	
Independence in Study		Leadership	
Reasoning		Attendance Habits	

List Special Talents or Outside Activities Observed

_____

_____

_____

List Any Special Social, Physical or Emotional Problems Observed

_____

_____

_____

Reason Why Student Does Not Belong in Program _____

_____

Mean Score _____ Mean Score _____

Scale:

1. Superior
2. Excellent
3. Good
4. Fair
5. Poor